Product Description Document (PDD)
Experimental National Impact Based Warnings

Part I - Mission Connection

a. Product Description – NWS Weather Forecast Offices (WFOs) issue Tornado Warnings (TOR), Severe Thunderstorm Warnings (SVR) and Severe Weather Statements (SVS - a follow-up to a TOR or SVR) as needed for their County Warning Area (CWA) of responsibility during severe convective weather events. These alphanumeric products provide the public, media and emergency managers with advance notice of damaging wind gusts, large hail, and tornadoes that pose a threat to life and property.

- A TOR is issued when there is radar indication and/or reliable reports of a tornado or developing tornado. Hazards associated with severe thunderstorms are nearly always attendant to the tornado threat as well.
- A SVR is issued when there is radar or satellite indication and/or reliable reports of wind gusts of 58 mph or greater, and/or hail of one inch (U.S. quarter-size) diameter or greater.
- The SVS is a "follow-up" statement which provides updated information as to the status of storms within a TOR (or SVR) warning area.

NWS proposes a simple but important change to the existing convective warning system to improve usefulness and effectiveness of severe convective warnings. For SVRs, forecasters will be presented two options within the WFO warning software: (1) a storm (or line of storms) may be identified as a traditional, baseline SVR threat, or (2) cells of interest may be identified as extreme storms, i.e., those with forecast hail of baseball-size or larger (>2.75") and/or wind gusts are predicted to exceed 80 mph (default threshold that may be configured locally).

Invoking the latter choice will trigger inclusion of enhanced verbiage concerning impacts and calls to action. It will also insert a highlight statement such as "This is a very dangerous storm". Finally, the option to include a tag line which explicitly states "TORNADO POSSIBLE" will be available. This messaging which highlights elevated danger may be selected during the issuance of an original warning (SVR) or in a follow-up statement (SVS).

For TORs, forecasters will be provided a number of options to clarify the level of threat based on level of severity.

The first option pertains to the standard or "base" TORs (which are the most common type issued through the season). For these "base" TORs, forecasters will be able to (1) include bullets that plainly and clearly communicate hazard and impact information, (2) utilize enhanced calls to action, as rephrased by social science partners, and (3) add "tags" at the end of the message with additional critical information. This information may include any or all of the following: (a) whether the tornado is observed or radar-indicated (implied statement of confidence in evidence), (b) predicted hail size, and (c) the option to add strength of non-tornadic thunderstorm-related wind. This warning type will be selected for cases in which there is *credible* evidence of a tornado.

The second option will be exercised in cases where there is *substantial* evidence of a tornado coincident with a high impact event. In such cases, the phrase "This is a Particularly Dangerous Situation" (PDS) will be utilized, along with enhanced wording within the second warning bullet to identify a high level of risk, describe expected damage and impacts, and promote serious urgency in taking action to seek shelter immediately. The "PDS" warning will also append an explicit damage threat reference in the form of a tag line code "TORNADO DAMAGE THREAT...CONSIDERABLE", rather than simply discriminating between observed or probable.

The third option will be used only for the most severe type of tornado warning. This option will be reserved for those rare cases in which a known, violent tornado is likely to produce devastating damage. For these situations, the enhanced wording will include a "TORNADO EMERGENCY" announcement, the recommended action will be brief, clear and extremely urgent (e.g., IF YOU ARE IN OR NEAR LIBERTY...SEEK SHELTER IMMEDIATELY!), and the tag line will read: TORNADO DAMAGE THREAT...CATASTROPHIC.

In 2012, five WFOs in the NWS Central Region demonstrated the impact-based convective warning experimental approach within their operational products. The demonstration was expanded to all 38 Central Region offices in the spring of 2013. Based on feedback from this expanded experiment, the 2014 demonstration will include some changes from the earlier Central Region demonstration (see below) and the number of WFOs will be increased to include 5 WFOs within NWS Southern Region (Norman, OK; Tulsa, OK; Jackson, MS; Lubbock, TX and San Angelo, TX); 1 WFO within NWS Eastern Region (Blacksburg, VA); and 2 WFOs within NWS Western Region (Great Falls, MT and Glasgow, MT).

The most significant change being proposed to the experimental Impact-Based Warnings for the 2014 national experiment is that the impact statements for “CONSIDERABLE”(second option) and those for “CATASTROPHIC” (third option) serve as markers of confidence of tornado occurrence, with both reflecting an “elevated tier” of tornado damage and risk. The term CATASTROPHIC will only be used when a tornado is striking an actual community.

b. Purpose – The purpose of this experiment is to improve the communication of crucial decision support and risk assessment information to partners and users within the guidelines of governing policy and the existing operational environment. The warnings will include streamlined, standardized, concise bullets to convey information about associated impacts, specific hazards expected, and recommended action designed to result in an improved public response to take immediate protective action.

c. Audience-- The target audience for the product includes: national, state and local emergency managers; media partners; the private weather enterprise; government and military agencies; and the general public.

d. Presentation Format – The enhanced wording design to highlight impacts, specific hazards and source of information prompting the warning will be inserted into the text area beneath the third mandatory bullet (immediately following the time, location and motion of the storm). A list of “recommended action” phrases will be selectable in the WFO warning software. The selection

will be inserted into the mandatory section labeled "PRECAUTIONARY/PREPAREDNESS ACTIONS". Relevant tags for Tornado, Hail and Wind will be automatically appended to the bottom of severe convective warnings (TOR, SVR) and follow-up statements (SVS) issued by all participating offices.

e. Feedback Method - Web feedback from the broader community will be sought via the following NWS customer survey link from March 25, 2014 to November 4, 2014:

http://www.weather.gov/survey/nws-survey.php?code=IBW

Additional evaluation will be conducted by social science research groups with media partners, emergency management and NWS forecasters using focus groups and surveys

Comments may also be provided to:
John Ferree
NWS Severe Storms Services Leader
120 David L. Boren Blvd. Suite 2312
Norman, OK 73072
405-325-2209
john.t.ferree@noaa.gov

II - Technical Description

a. Format and Science Basis – Compelling evidence exists to support the capability of NWS forecasters to differentiate the strong/violent tornadoes from the less damaging tornadoes. Nationwide, 68% of NWS warnings for EF0-1 tornadoes achieve at least 12 minutes lead time (a metric of advance notice measured from warning dissemination to verified occurrence). However, the success rate for advance prediction of EF3-5 tornado warnings is substantially better (94%), as is the average lead time (18 minutes). There are clearly exceptions but, in general, performance metrics indicate a statistically significant skill in detecting and predicting catastrophic tornadoes as compared to all tornadoes. Additional training to reinforce the scientific understanding and warning methodologies needed to diagnose those extreme cases is being provided for the offices participating in this experiment.

The coded tag lines appended to the bottom of every TOR, SVR and SVS products after the double ampersand (&&) directly below the existing TIME…MOT…LOC line and before the double dollar sign ($$).

The enhanced wording designed to communicate severity, hazards, and impacts will be inserted into the third mandatory bullet section, which begins "AT <time> CDT…"

The tag lines will be appended to TOR, SVR and appropriate follow-up SVS products, after the double ampersand (&&) and the "Lat/Lon" and "Time/Motion/Location" lines, as follows,

TORNADO…<descriptor; optional for SVR>
TORNADO DAMAGE THREAT…<descriptor>

HAIL… x.xxIN
WIND…xxMPH <optional for TOR>

where x.xx represents the expected maximum hail size in inches, and xx represents maximum expected thunderstorm-induced wind speed.

Allowable Coded Tag Line Values

The allowable values for hail and wind tag lines are coded and defined as follows:

Tornado Values for TOR and TOR related SVS

TORNADO…RADAR INDICATED
TORNADO…OBSERVED
TORNADO DAMAGE THREAT…CONSIDERABLE
TORNADO DAMAGE THREAT…CATASTROPHIC

For SVR/SVS the tornado tag line typically will not be appended. However when conditions warrant, the option to identify possible tornado formation will be available in the form of the following tag:
TORNADO…POSSIBLE

Hail Values for TOR/SVR/SVS

(Flexibility is given to local offices to add other events with 0.75 being the lowest allowable specified value, other than "no hail" and "smaller than three-quarter inch" values. The lowest value of hail size considered to meet "severe thunderstorm" criterion is 1-inch in diameter.)

0.00 Equates to no hail
<.75 Small hail expected
0.75 0.75 inch hail (penny-sized)
0.88 0.88 inch hail (nickel-sized)
1.00 1.00 inch hail (minimal SVR criterion for hail size)
1.50 1.50 inch hail (ping pong ball-sized)
1.75 1.75 inch hail (golf ball-sized)
2.50 2.50 inch (tennis ball-sized)
2.75 2.75 inch hail (baseball-sized)
4.25 4.25 inch hail (softball-sized) or larger and is the highest allowable value

Wind Values for TOR/SVR/SVS

Dimensions are in MPH. Flexibility is granted to add other events in 5 mph increments, but default template value choices are:

<50 Wind gusts below severe criteria and lowest allowable value (for SVR hail only)
60 60 mph peak wind gust and is the first allowable value above <50 (severe criteria)
70 Used for warnings where wind is expected to be GTE 70 mph but LT 80 mph
80 Used for warnings where wind is expected to be GTE 80 mph but LT 90 mph
90 Used for warnings where wind is expected to be GTE 90 mph but LT 100 mph
100 100 mph or higher peak wind gust and is the highest allowable value (significant structural damage)

b. Availability - This enhanced product is available through all distribution channels which currently disseminate TOR, SVR, and SVS warning products.

C. Additional Information – Example of PDS Warning (next page).

WFUS53 KILX 171712
TORILX
ILC123-179-203-171745-
/O.NEW.KILX.TO.W.0013.131117T1712Z-131117T1745Z/

BULLETIN - EAS ACTIVATION REQUESTED
TORNADO WARNING
NATIONAL WEATHER SERVICE LINCOLN IL
1112 AM CST SUN NOV 17 2013

THE NATIONAL WEATHER SERVICE IN LINCOLN HAS ISSUED A

* TORNADO WARNING FOR...
  SOUTHEASTERN MARSHALL COUNTY IN CENTRAL ILLINOIS...
  NORTHEASTERN TAZEWELL COUNTY IN CENTRAL ILLINOIS...
  WOODFORD COUNTY IN CENTRAL ILLINOIS...

* UNTIL 1145 AM CST

* AT 1107 AM CST...A CONFIRMED LARGE AND EXTREMELY DANGEROUS TORNADO
  WAS LOCATED NEAR WASHINGTON...AND MOVING NORTHEAST AT 65 MPH.

  THIS IS A PARTICULARLY DANGEROUS SITUATION.

  HAZARD...DAMAGING TORNADO.

  SOURCE...RADAR CONFIRMED TORNADO.

  IMPACT...YOU ARE IN A LIFE THREATENING SITUATION. FLYING DEBRIS
           MAY BE DEADLY TO THOSE CAUGHT WITHOUT SHELTER. MOBILE
           HOMES WILL BE DESTROYED. CONSIDERABLE DAMAGE TO
           HOMES...BUSINESSES AND VEHICLES IS LIKELY AND COMPLETE
           DESTRUCTION IS POSSIBLE.

* LOCATIONS IMPACTED INCLUDE...
  ROANOKE...MINONK...TOLUCA...WENONA...CAZENOVIA...LOW POINT...BENSON
  AND PATTONSBURG.

THIS INCLUDES INTERSTATE 39 BETWEEN MILE MARKERS 22 AND 38.

PRECAUTIONARY/PREPAREDNESS ACTIONS...

TO REPEAT...A LARGE...EXTREMELY DANGEROUS AND POTENTIALLY DEADLY
TORNADO IS ON THE GROUND. TO PROTECT YOUR LIFE...TAKE COVER NOW. MOVE
TO AN INTERIOR ROOM ON THE LOWEST FLOOR OF A STURDY BUILDING. AVOID
WINDOWS. IF IN A MOBILE HOME...A VEHICLE OR OUTDOORS...MOVE TO THE
CLOSEST SUBSTANTIAL SHELTER AND PROTECT YOURSELF FROM FLYING DEBRIS.

&&

LAT...LON 4094 8904 4093 8894 4093 8893 4088 8893
      4064 8935 4078 8951 4108 8905 4107 8904
TIME...MOT...LOC 1712Z 230DEG 57KT 4077 8933

TORNADO...OBSERVED
TORNADO DAMAGE THREAT...CONSIDERABLE
HAIL...0.00IN

$$